Woodcock-Johnson® III

Assessment Service Bulletin Number 4

Calculating Ability/Achievement Discrepancies Between the *Wechsler Intelligence Scale for Children–Third Edition* and the *Woodcock-Johnson III Tests of Achievement*

Fredrick A. Schrank, PhD, ABPP
Kirk A. Becker
Scott Decker

This bulletin outlines a step-by-step procedure for calculating ability/achievement discrepancies between the Wechsler Intelligence Scale for Children–Third Edition *(WISC-III) (Wechsler, 1991) and the* Woodcock-Johnson III Tests of Achievement *(WJ III ACH) (Woodcock, McGrew, & Mather, 2001a). It includes a reproducible worksheet for calculating these discrepancies. The procedure is based on correlations between the measures obtained from a broad sample of non-referred individuals (N = 252) aged 6-2 to 16-10. The correlations were subsequently corrected for restriction in range to obtain the best approximation of the values for the population parameters defined by both measures. The predicted achievement scores, which were obtained using the outlined procedure, contain a correction for regression to the mean (Blommers & Forsyth, 1977). The correction for regression to the mean allows professionals to determine predicted, or expected, achievement scores for individuals. For educational agencies that use a significance criterion expressed in standard deviation (SD) units, such as $\pm$ 1.5 SD, the procedure includes an additional step. This step is a calculation that uses the standard error of the estimate (SEE) of the discrepancy score distribution, which is the appropriate standard deviation to use for this purpose.*

Printed in the United States of America.

WJ III, the WJ III logo, and Woodcock-Johnson are registered trademarks of Houghton Mifflin Company.

Reference Citation

■ To cite this document, use:

Schrank, F. A., Becker, K. A., & Decker, S. (2001). *Calculating ability/achievement discrepancies between the Wechsler Intelligence Scale for Children–Third Edition and the Woodcock-Johnson III Tests of Achievement* (Assessment Service Bulletin No. 4*). Itasca, IL: Riverside Publishing.

The WISC-III/WJ III ACH ability/achievement discrepancy calculations outlined in this bulletin are automated in the *Report Writer for the WJ III* (Schrank & Woodcock, in press).

For technical information, please call 1.800.323.9540 or visit our website at www.woodcock-johnson.com

Calculating Ability/Achievement Discrepancies Between the *Wechsler Intelligence Scale for Children–Third Edition* and the *Woodcock-Johnson III Tests of Achievement*

Ideally, ability/achievement discrepancy scores should be obtained using actual discrepancy norms from co-normed cognitive and achievement tests, such as the *Woodcock-Johnson III Tests of Cognitive Ability* (WJ III COG) (Woodcock, McGrew, & Mather, 2001b) and the *Woodcock-Johnson III Tests of Achievement* (WJ III ACH) (Woodcock, McGrew, & Mather, 2001a). However, some tests used to calculate ability/achievement discrepancies are not co-normed. When using a pair of tests that are not co-normed, such as the WISC-III and the WJ III ACH, ability/achievement discrepancy scores must be corrected for regression to the mean.

The correction for regression to the mean, which is based on the correlation between the measures, provides an approximate or estimated value of what would be obtained if discrepancy norms were available.[1] If correction for regression is not performed, the obtained discrepancies will be inaccurate and will lead to biased predictions and possible faulty placement decisions. This is due to a certain degree of prediction error that occurs whenever the correlation between two tests is less than 1. Uncorrected ability/achievement discrepancies using the WISC-III and the WJ III ACH scores will be systematically biased for students with Full Scale Intelligence Quotient (FSIQ) scores above or below the mean. That is, uncorrected discrepancy estimates will *overidentify* students with high intellectual ability (FSIQ > 100) as possessing a significant discrepancy and will *underidentify* students with low intellectual ability (FSIQ < 100) as possessing a significant discrepancy. Correcting for regression to the mean eliminates this prediction bias.

Unless a student's WISC-III FSIQ score is at or near 100, the predicted achievement score for that individual is not the same as his or her FSIQ score. Because WISC-III FSIQ and the WJ III achievement measures are not perfectly correlated, the WISC-III FSIQ score must be adjusted for regression to the mean to obtain a predicted achievement score. The predicted score is then compared to the actual WJ III achievement score to obtain the discrepancy. For example, if a student has a WISC-III FSIQ of 130, and the correlation between the WISC-III and a particular WJ III achievement cluster is .70, the adjusted aptitude score (predicted achievement score) is 121. If a state education agency requires a 15-point discrepancy for placement, then the criterion achievement score is 106 (121 minus 15), not 115 (130 minus 15). Conversely, if a student has a WISC-III FSIQ of 70, the correction for regression to the mean operates in the other direction. In that case, the predicted achievement score is 79, not 70, resulting in a criterion achievement score of 64 (79 minus 15), not 55 (70 minus 15).

---

[1] The equation used to correct for the effect of regression to the mean is: $y' = r_{xy} (X - 100) + 100$ where y' is the predicted achievement score based on ability score X, and r_{xy} is the correlation between ability and achievement.

Frequently, professionals calculate discrepancies between two measures using a point-difference criterion, such as a difference of 15 or 22 points. This practice is based on an assumption that 15 points represents one standard deviation and 22 points represents 1.5 standard deviations. However, the standard deviation of the discrepancy score distribution is not the same as the standard deviation of either individual measure. It is the standard error of the estimate[2] (*SEE*), not the standard deviation of the WISC-III or the WJ III ACH, that should be used to determine the significance of a discrepancy (Pedhazur, 1997). The *SEE* is the standard deviation of the actual WJ III ACH scores around the predicted score (the score that is corrected for regression) for a group of individuals having the same WISC-III FSIQ score. The *SEE* of the WISC-III/WJ III ACH ability/achievement discrepancy scores ranges between 8.77 and 12.61 standard score points, depending on the correlation between the measures. The higher the correlation between the WISC-III FSIQ and the particular WJ III measure of achievement, the smaller the *SEE*. Comparing the WJ III achievement measures that are more highly correlated with the WISC-III FSIQ will result in smaller *SEE* values and consequently will require a smaller difference between the two scores to be significant (that is, to identify the same number of students as having a significant discrepancy).

Examiners may also assume that discrepancies of 1 or 1.5 *SEE* are significant. But this should not be translated to mean that discrepancies of 15 (1 *SD*) or 22 (1.5 *SD*) standard score points are also significant. A WISC-III/WJ III ACH ability/achievement standard score discrepancy of 8.77 to 12.61 points (depending on the curriculum area) actually represents a discrepancy that is 1 *SD* above or below the mean discrepancy score.

Method

To obtain the necessary correlations for calculating ability/achievement discrepancies between the WISC-III and the WJ III ACH, a non-referred sample of subjects (*N* = 252) was administered the WISC-III and the WJ III ACH. The sample ranged in age from 6 years, 2 months to 16 years, 10 months (*M* = 10 years, 5 months; *SD* = 28 months). The socio-economic status (SES) level of the sample was broad. The fathers' educational level for the sample included roughly 10% with less than a high school education, 21% high school graduates, 38% with some college, 29% college graduates, and 1% unreported. The mothers' educational level was similar and included roughly 9% with less than a high school education, 23% high school graduates, 40% with some college, 28% college graduates, and <1% unreported.

Because the sample variance is somewhat truncated, as indicated by the standard deviations, a correction for restriction in range should be applied to avoid drawing incorrect conclusions about the correlation between measures (Guilford & Fruchter, 1978). Table 1, therefore, shows the observed and corrected correlations among all variables as well as the means and standard deviations. The corrected correlations were used in the subsequent regression tables.

---

[2] The equation used to estimate the SEE is $SD_y\sqrt{1 - r_{xy}^2}$ where SD_y is the standard deviation of the achievement test (15), and r_{xy}^2 is the squared correlation between ability and achievement.

Table 1.

Obtained and Corrected Correlations Between WJ III Composite Scores and WISC-III FSIQ

WJ III Cluster	n	Obtained Correlations FSIQ	Corrected Correlations FSIQ	Mean	SD
Broad Reading	248	0.61	0.72	105.24	12.95
Basic Reading Skills	250	0.45	0.59	103.50	11.86
Reading Comprehension	216	0.65	0.73	105.11	13.88
Broad Math	251	0.60	0.70	106.72	13.44
Math Calculation Skills	252	0.49	0.61	104.22	12.91
Math Reasoning	252	0.61	0.75	105.85	11.75
Broad Written Language	250	0.43	0.57	104.85	12.12
Basic Writing Skills	246	0.47	0.59	102.83	12.62
Written Expression	250	0.44	0.55	105.48	12.80
Oral Expression	252	0.52	0.61	107.58	13.67
Listening Comprehension	244	0.38	0.54	105.00	11.12
Academic Knowledge	227	0.67	0.81	103.75	11.37
Mean		103.87			
SD		12.90			

Procedures for Calculating Ability/Achievement Discrepancies

To calculate the ability/achievement discrepancies between the WISC-III and the WJ III ACH, use the worksheet provided on page 7 and follow the steps below.

1. Record the WISC-III FSIQ in the blank in the top right corner.

2. Record standard scores for WJ III achievement clusters administered in Column 2 Actual Achievement.

3. Locate the standard score for the WISC-III FSIQ in the left column of Table 2. The columns to the right show the predicted WJ III achievement scores for the various ability levels. For example, a WISC-III FSIQ of 80 would predict a Broad Reading score of 86 (the expected mean achievement of all individuals with an FSIQ of 80). Record the predicted scores for each cluster score in Column 3 Predicted Achievement.

4. Subtract the Predicted Achievement scores from the Actual Achievement scores and record these values in Column 4 Ability/Achievement *SS* Difference. If a specific standard score point value is required to document a significant discrepancy (such as a difference of 15 or 22 points), the required value can be compared with the values in Column 4.

5. Divide the values in Column 4 Ability/Achievement *SS* Difference by the values in Column 5 *SEE*.

6. Record the resulting values in Column 6 Discrepancy *SD*. The Discrepancy *SD* is a standardized *z* score that expresses the discrepancy in standard deviation units, such as ± 1.5 *SD*. If the criterion for a significant discrepancy is expressed in standard deviation units (such as – 1.5 *SD*), this column provides the necessary information.

Table 2.

Expected Achievement on the WJ III
Given WISC-III FSIQ and Correction
for Regression to the Mean

WISC-III FSIQ	Broad Reading	Basic Reading Skills	Reading Comp	Broad Math	Math Calculation Skills	Math Reasoning	Broad Written Language	Basic Writing Skills	Written Expression	Oral Expression	Listening Comp	Academic Knowledge
40	57	65	56	58	63	55	66	65	67	63	68	51
41	58	65	57	59	64	56	67	65	67	64	68	52
42	58	66	58	60	65	57	67	66	68	64	69	53
43	59	66	59	60	65	57	68	66	68	65	69	54
44	60	67	59	61	66	58	68	67	69	66	70	55
45	61	67	60	62	66	59	69	68	70	66	70	55
46	61	68	61	62	67	60	69	68	70	67	71	56
47	62	69	61	63	68	60	70	69	71	68	71	57
48	63	69	62	64	68	61	70	69	71	68	72	58
49	63	70	63	65	69	62	71	70	72	69	72	59
50	64	70	64	65	70	63	72	70	72	69	73	59
51	65	71	64	66	70	63	72	71	73	70	73	60
52	66	72	65	67	71	64	73	72	73	71	74	61
53	66	72	66	67	71	65	73	72	74	71	75	62
54	67	73	67	68	72	66	74	73	75	72	75	63
55	68	73	67	69	73	66	74	73	75	72	76	63
56	68	74	68	69	73	67	75	74	76	73	76	64
57	69	75	69	70	74	68	76	75	76	74	77	65
58	70	75	69	71	74	69	76	75	77	74	77	66
59	71	76	70	71	75	69	77	76	77	75	78	67
60	71	76	71	72	76	70	77	76	78	75	78	68
61	72	77	72	73	76	71	78	77	78	76	79	68
62	73	78	72	74	77	72	78	78	79	77	79	69
63	74	78	73	74	77	72	79	78	80	77	80	70
64	74	79	74	75	78	73	80	79	80	78	81	71
65	75	79	75	76	79	74	80	79	81	79	81	72
66	76	80	75	76	79	75	81	80	81	79	82	72
67	76	80	76	77	80	75	81	81	82	80	82	73
68	77	81	77	78	81	76	82	81	82	80	83	74
69	78	82	77	78	81	77	82	82	83	81	83	75
70	79	82	78	79	82	78	83	82	83	82	84	76
71	79	83	79	80	82	78	84	83	84	82	84	76
72	80	83	80	81	83	79	84	83	85	83	85	77
73	81	84	80	81	84	80	85	84	85	83	85	78
74	81	85	81	82	84	81	85	85	86	84	86	79
75	82	85	82	83	85	81	86	85	86	85	86	80
76	83	86	83	83	85	82	86	86	87	85	87	81
77	84	86	83	84	86	83	87	86	87	86	88	81
78	84	87	84	85	87	84	88	87	88	87	88	82
79	85	88	85	85	87	84	88	88	88	87	89	83

Table 2. *(cont.)*
Expected Achievement on the WJ III
Given WISC-III FSIQ and Correction
for Regression to the Mean

WISC-III FSIQ	Broad Reading	Basic Reading Skills	Reading Comp	Broad Math	Math Calculation Skills	Math Reasoning	Broad Written Language	Basic Writing Skills	Written Expression	Oral Expression	Listening Comp	Academic Knowledge
80	86	88	85	86	88	85	89	89	89	89	89	84
81	86	89	86	87	88	86	89	89	89	89	90	85
82	87	89	87	87	89	87	90	89	90	89	90	85
83	88	90	88	88	90	87	90	90	91	90	91	86
84	89	91	88	89	90	88	91	91	91	90	91	87
85	89	91	89	90	91	89	91	91	92	91	92	88
86	90	92	90	90	91	90	92	92	92	91	92	89
87	91	92	91	91	92	90	93	92	93	92	93	89
88	91	93	91	92	93	91	93	93	93	93	94	90
89	92	93	92	92	93	92	94	94	94	93	94	91
90	93	94	93	93	94	93	94	94	94	94	95	92
91	94	95	93	94	95	93	95	95	95	94	95	93
92	94	95	94	94	95	94	95	95	96	95	96	94
93	95	96	95	95	96	95	96	96	96	96	96	94
94	96	96	96	96	96	96	97	96	97	96	97	95
95	96	97	96	97	97	96	97	97	97	97	97	96
96	97	98	97	97	98	97	98	98	98	98	98	97
97	98	98	98	98	98	98	98	98	98	98	98	98
98	99	99	99	99	99	99	99	99	99	99	99	98
99	99	99	99	99	99	99	99	99	99	99	99	99
100	100	100	100	100	100	100	100	100	100	100	100	100
101	101	101	101	101	101	101	101	101	101	101	101	101
102	101	101	101	101	101	101	101	101	101	101	101	102
103	102	102	102	102	102	102	102	102	102	102	102	102
104	103	102	103	103	102	103	102	102	102	102	102	103
105	104	103	104	103	103	104	103	103	103	103	103	104
106	104	104	104	104	104	104	103	104	103	104	103	105
107	105	104	105	105	104	105	104	104	104	104	104	106
108	106	105	106	106	105	106	105	105	104	105	104	106
109	106	105	107	106	105	107	105	105	105	106	105	107
110	107	106	107	107	106	107	106	106	106	106	105	108
111	108	107	108	108	107	108	106	106	106	107	106	109
112	109	107	109	108	107	109	107	107	107	107	106	110
113	109	108	109	109	108	110	107	108	107	108	107	111
114	110	108	110	110	109	110	108	108	108	109	108	111
115	111	109	111	110	109	111	109	109	108	109	108	112
116	111	109	112	111	110	112	109	109	109	110	109	113
117	112	110	112	112	110	113	110	110	109	110	109	114
118	113	111	113	113	111	113	110	111	110	111	110	115
119	114	111	114	113	112	114	111	111	111	112	110	115

5

Table 2. *(cont.)*
Expected Achievement on the WJ III
Given WISC-III FSIQ and Correction
for Regression to the Mean

WISC-III FSIQ	Broad Reading	Basic Reading Skills	Reading Comp	Broad Math	Math Calculation Skills	Math Reasoning	Broad Written Language	Basic Writing Skills	Written Expression	Oral Expression	Listening Comp	Academic Knowledge
120	114	112	115	114	112	115	111	112	111	112	111	116
121	115	112	115	115	113	116	112	112	112	113	111	117
122	116	113	116	115	113	116	112	113	112	113	112	118
123	116	114	117	116	114	117	113	114	113	114	112	119
124	117	114	117	117	115	118	114	114	113	115	113	119
125	118	115	118	117	115	119	114	115	114	115	114	120
126	119	115	119	118	116	119	115	115	114	116	114	121
127	119	116	120	119	116	120	115	116	115	117	115	122
128	120	117	120	119	117	121	116	117	115	117	115	123
129	121	117	121	120	118	122	116	117	116	118	116	124
130	121	118	122	121	118	122	117	118	117	118	116	124
131	122	118	123	122	119	123	118	118	117	119	117	125
132	123	119	123	122	119	124	118	119	118	120	117	126
133	124	120	124	123	120	125	119	119	118	120	118	127
134	124	120	125	124	121	125	119	120	119	121	118	128
135	125	121	125	124	121	126	120	121	119	121	119	128
136	126	121	126	125	122	127	120	121	120	122	119	129
137	126	122	127	126	123	128	121	122	120	123	120	130
138	127	122	128	126	123	128	122	122	121	123	121	131
139	128	123	128	127	124	129	122	123	122	124	121	132
140	129	124	129	128	124	130	123	124	122	125	122	132
141	129	124	130	129	125	131	123	124	123	125	122	133
142	130	125	131	129	126	131	124	125	123	126	123	134
143	131	125	131	130	126	132	124	125	124	126	123	135
144	132	126	132	131	127	133	125	126	124	127	124	136
145	132	127	133	131	127	134	126	127	125	128	124	137
146	133	127	133	132	128	134	126	127	125	128	125	137
147	134	128	134	133	129	135	127	128	126	129	125	138
148	134	128	135	133	129	136	127	128	127	129	126	139
149	135	129	136	134	130	137	128	129	127	130	127	140
150	136	130	136	135	130	137	128	130	128	131	127	141
151	137	130	137	135	131	138	129	130	128	131	128	141
152	137	131	138	136	132	139	130	131	129	132	128	142
153	138	131	139	137	132	140	130	131	129	132	129	143
154	139	132	139	138	133	140	131	132	130	133	129	144
155	139	133	140	138	134	141	131	132	130	134	130	145
156	140	133	141	139	134	142	132	133	131	134	130	145
157	141	134	141	140	135	143	132	134	132	135	131	146
158	142	134	142	140	135	143	133	134	132	136	131	147
159	142	135	143	141	136	144	133	135	133	136	132	148
160	143	135	144	142	137	145	134	135	133	137	132	149

WISC-III/WJ III ACH Ability/Achievement Discrepancy Calculation Worksheet

Name_____   WISC-III FSIQ _____

WJ III Achievement Clusters	Column 2 Actual Achievement		Column 3 Predicted Achievement (Table 2)		Column 4 Ability/ Achievement SS Difference		Column 5 SEE		Column 6 Discrepancy SD
Broad Reading	☐	–	☐	=	☐	÷	10.47	=	☐
Basic Reading Skills	☐	–	☐	=	☐	÷	12.10	=	☐
Reading Comprehension	☐	–	☐	=	☐	÷	10.29	=	☐
Broad Math	☐	–	☐	=	☐	÷	10.77	=	☐
Math Calculation Skills	☐	–	☐	=	☐	÷	11.90	=	☐
Math Reasoning	☐	–	☐	=	☐	÷	9.94	=	☐
Broad Written Language	☐	–	☐	=	☐	÷	12.35	=	☐
Basic Writing Skills	☐	–	☐	=	☐	÷	12.11	=	☐
Written Expression	☐	–	☐	=	☐	÷	12.50	=	☐
Oral Expression	☐	–	☐	=	☐	÷	11.85	=	☐
Listening Comprehension	☐	–	☐	=	☐	÷	12.61	=	☐
Academic Knowledge	☐	–	☐	=	☐	÷	8.77	=	☐

References

Blommers, P. J., & Forsyth, R. A. (1977). *Elementary statistical methods in psychology and education* (2nd ed.). Boston: Houghton Mifflin.

Guilford J. P., & Fruchter, B. (1978). *Fundamental statistics in psychology and education.* New York: McGraw-Hill.

Pedhazur, E. J. (1997). *Multiple regression in behavioral research: Explanation and prediction* (3rd ed.). Fort Worth, TX: Harcourt Brace.

Schrank, F. A., & Woodcock, R. W. (in press). *Report Writer for the WJ III.* Itasca, IL: Riverside Publishing.

Wechsler, D. (1991). *Wechsler Intelligence Scale for Children* (3rd ed.). San Antonio, TX: Psychological Corporation.

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001a). *Woodcock-Johnson III Tests of Achievement.* Itasca, IL: Riverside Publishing.

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001b). *Woodcock-Johnson III Tests of Cognitive Abilities.* Itasca, IL: Riverside Publishing.